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Title: *Magnetic Storms, Fossil Neutral Winds and Ionospheric Electric Fields*

Cluster: *Cross-Theme Theory and Data Analysis/SECTP*

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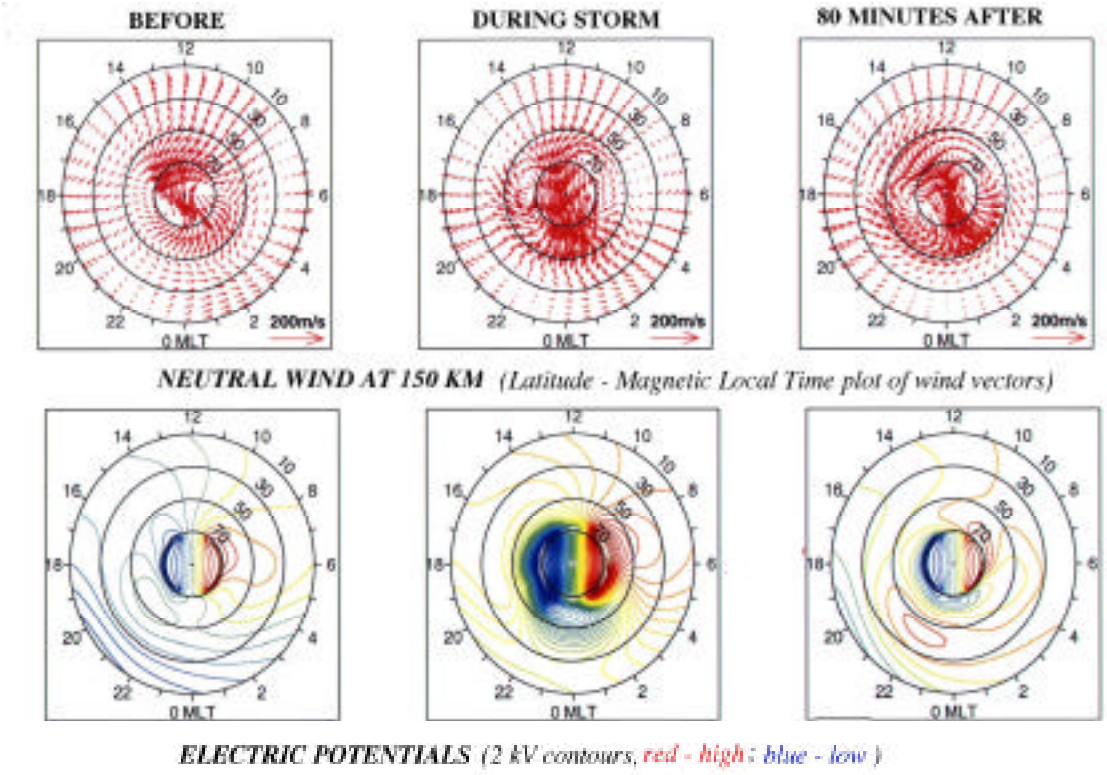
• Persistence of Magnetic Storm-Driven Upper Atmospheric Winds and E-Fields

High latitude ionospheric energy inputs from the magnetosphere during terrestrial magnetic storms induce global thermospheric neutral wind perturbations. The disturbed neutral winds in turn drag ionospheric ions across the Earth's magnetic field generating dynamo electric fields. Even after the storm stops, the induced winds are maintained by inertia. This "fossil" wind causes electric field disturbances to persist for several hours after a storm. This was modeled at NCAR using the Magnetosphere-Thermosphere-Ionosphere-Electrodynamics Circulation Model, developed with support from the NASA Sun-Earth Connection Theory Program. This is the first self-consistent simulation of the coupled thermosphere-ionosphere-magnetosphere system to successfully demonstrate how storm-disturbed neutral winds affect the low-latitude ionosphere.

Understanding how the upper atmosphere responds to magnetospheric energy inputs and its consequent impact on the ionospheric electric field distribution is an important component of the Sun-Earth Connection Roadmap quest to understand how the Earth and Planets respond to solar variations. This new result is a significant advancement in our capability to predict Space Weather effects in the near-Earth environment, and provides needed guidance for NASA satellite investigations of multi-scale processes in the ionosphere-thermosphere system (e.g., the multi-satellite **G**eospace **E**lectrodynamic **C**onnections mission).

Modeled neutral wind and electric field global response to a magnetic storm



Richmond, A.D., and C. Peymirat, "Sources of low-latitude ionospheric electric-field disturbances", Fall AGU meeting, San Francisco, 2001 December 11.